

Claims

1. Method for modifying plant growth and development, comprising introducing a genetic modification in said plant and selecting for modulated expression in said plant of a nucleic acid encoding a metallothionein protein, provided that said modified growth and development is not increased metal accumulation or increased tolerance or resistance to abiotic stress.
2. Method according to claim 1, wherein said modified plant growth and development is increased yield, preferably an increase of biomass and/or seed yield, when compared to corresponding wild type plants.
3. Method according to claim 2, wherein said increased seed yield comprises increased total number of seeds and/or increased total weight of seeds, when compared to corresponding wild type plants.
4. Method according to any of claims 1 to 3, wherein said modulated expression is increased expression.
5. Method according to any of claims 1 to 4, wherein said genetic modification comprises introducing an isolated nucleic acid encoding a metallothionein protein into a plant.
6. Method according to any of claims 1 to 5, wherein said nucleic acid encoding a metallothionein protein encodes a type 2 metallothionein.
7. Method according to claim 6, wherein said nucleic acid is derived from a plant, preferably from a dicotyledonous plant, more preferably from the family Brassicaceae, most preferably the nucleic acid sequence is from *Arabidopsis thaliana*.
8. Method according to any of claims 5 to 7, wherein said nucleic acid sequence and said proteins include variants chosen from:
 - (i) a nucleic acid as represented by SEQ ID NO: 1 or encoding a metallothionein protein as represented by SEQ ID NO: 2;
 - (ii) an alternative splice variant of a nucleic acid sequence encoding a metallothionein protein or wherein said metallothionein protein is encoded by a splice variant;
 - (iii) an allelic variant of a nucleic acid sequence encoding a metallothionein protein or wherein said metallothionein protein is encoded by an allelic variant;

- (iv) a nucleic acid encoding a functional portion of a metallothionein protein;
- (v) a metallothionein protein as represented by SEQ ID NO: 2
- (vi) homologues, derivatives and active fragments of a metallothionein protein.

5 9. Method according to any of claims 5 to 8, wherein expression of said nucleic acid encoding a metallothionein is driven by a constitutive promoter, preferably the rice GOS2 promoter.

10 10. Plants obtainable by a method according to any of claims 1 to 9.

11. A construct comprising:

- (i) a nucleic acid sequence encoding a metallothionein;
- (ii) a GOS2 promoter capable of driving expression of the nucleic acid sequence of (i);
and optionally
- 15 (iii) a transcription termination sequence.

12. Construct according to claim 11, wherein said nucleic acid sequence encoding a metallothionein is chosen from the group comprising:

- 20 (i) a nucleic acid sequence represented by SEQ ID NO: 1 or the complement strand thereof;
- (ii) a nucleic acid sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or homologues, derivatives or active fragments thereof;
- (iii) a nucleic acid sequence according to (i) to (ii) above which is degenerated as a results of the genetic code;
- 25 (iv) nucleic acid sequence which is an allelic variant of the nucleic acid sequences according to (i) to (iii);
- (v) nucleic acid sequence which is an alternative splice variant of the nucleic acid sequences according to (i) to (iv);

30 13. Construct comprising the expression cassette as presented in SEQ ID NO 7.

14. Method for the production of a transgenic plant having modified growth and development according to claim 1, which method comprises:

- 35 (i) introducing into a plant or plant cell a nucleic acid sequence or a portion thereof encoding a metallothionein or a homologue, derivative or active fragment thereof;
- (ii) regenerating and/or growing a plant from a transgenic plant cell.

15. Transgenic plant comprising an introduced nucleic acid encoding metallothionein and having modified growth and development according to claim 1, characterised in that the modified growth and development is the consequence of modulated expression of a nucleic acid encoding a metallothionein.
- 5 16. Transgenic plant according to claim 15, selected for increased expression of a nucleic acid encoding metallothionein.
- 10 17. Transgenic plant according to claim 15 or 16, wherein said plant is a crop plant comprising soybean, sunflower, canola, alfalfa, rapeseed or cotton, preferably, the plant according to the present invention is a monocotyledonous plant such as sugarcane, most preferably a cereal, such as rice, maize, wheat, millet, barley, oats, sorghum.
- 15 18. Transgenic plant cells, transgenic plants or transgenic plant parts, including harvestable parts, propagules, seeds or transgenic progeny of a plant according to any of claims 15 to 17.
- 20 19. Use of a nucleic acid sequence encoding a metallothionein or encoding homologues, derivatives or active fragments thereof in modifying the growth characteristics of plants, provided that said modified growth and development is not increased metal accumulation or increased tolerance or resistance to abiotic stress.
- 25 20. Use of a metallothionein protein and homologues, derivatives and active fragments thereof in modifying the growth characteristics of plants, provided that said modified growth and development is not increased metal accumulation or increased tolerance or resistance to abiotic stress.
- 30 21. Use according to claim 19 or 20, wherein said modified growth and development is increased yield and/or increased biomass, preferably increased seed yield, when compared to corresponding wild type plants.
- 35 22. Use according to claim 21, wherein said increased seed yield comprises increased total number of seeds and/or increased total weight of seeds, when compared to corresponding wild type plants.

23. A composition comprising a nucleic acid sequence as represented by SEQ ID NO: 1 or a portion thereof or a sequence represented by SEQ ID NO: 2 or homologues, derivatives and active fragments thereof for modifying plant growth and development, preferably for increasing yield and/or biomass of a plant, more preferably for increasing seed yield, provided that said modified growth and development is not increased metal accumulation or increased tolerance or resistance to abiotic stress.
24. Use of a nucleic acid sequence as represented by SEQ ID NO: 1 or a portion thereof or a sequence represented by SEQ ID NO: 2 or homologues, derivatives and active fragments thereof as a growth regulator.